FCF Preliminary Design Review
Review Team Lead Coordination Meeting

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Agenda

- FCF Overview
- PDR
  - Purpose and Scope
  - Process
  - Guidelines
- Team Lead Responsibilities
  - Organizing the team
  - Team review
  - Pre-Board
- On-line PDR System
  - Documentation
  - RIDs

Background

- The FCF is a modular, multi-user facility being developed by the Glenn Research Center (GRC) for permanent installation in the ISS United States Laboratory Module to support microgravity fluid physics and combustion science.

- The FCF project establishes an initial operational capability for microgravity fluid physics and combustion science on-board ISS. The project's scope is through the design, development, production, deployment and initial operation of the FCF in ISS. The FCF design must also respond to the life cycle needs of the science programs, per the SRED.

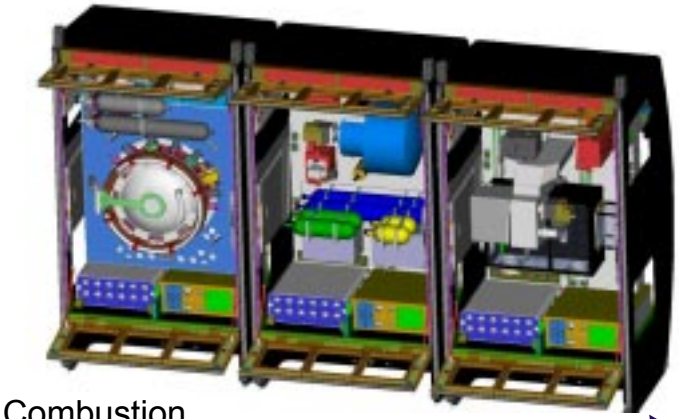
- Multi-user Droplet Combustion Apparatus (MDCA) and Light Microscopy Module (LMM) experiments are initial combustion and fluids payloads associated with initial FCF operations in ISS. Their developments (and other fluids/combustion payload developments) are not within the scope of the FCF project.

- The FCF project transitions to a steady-state utilization program after on-orbit acceptance of the last FCF rack deployed (i.e., the FCF SAR).

- The FCF is a Microgravity Science Program resource. The success of the FCF and the Program are interdependent. Both rely on matrix support from various performing organizations at GRC (MSD, E&TS, OSAT, etc.) and the success of the MRDOC prime contractor.

FCF Scope

ISS Fluids and Combustion Facility



Combustion Integrated Rack | Shared Accommodations Rack | Fluids Integrated Rack

Flight Segment

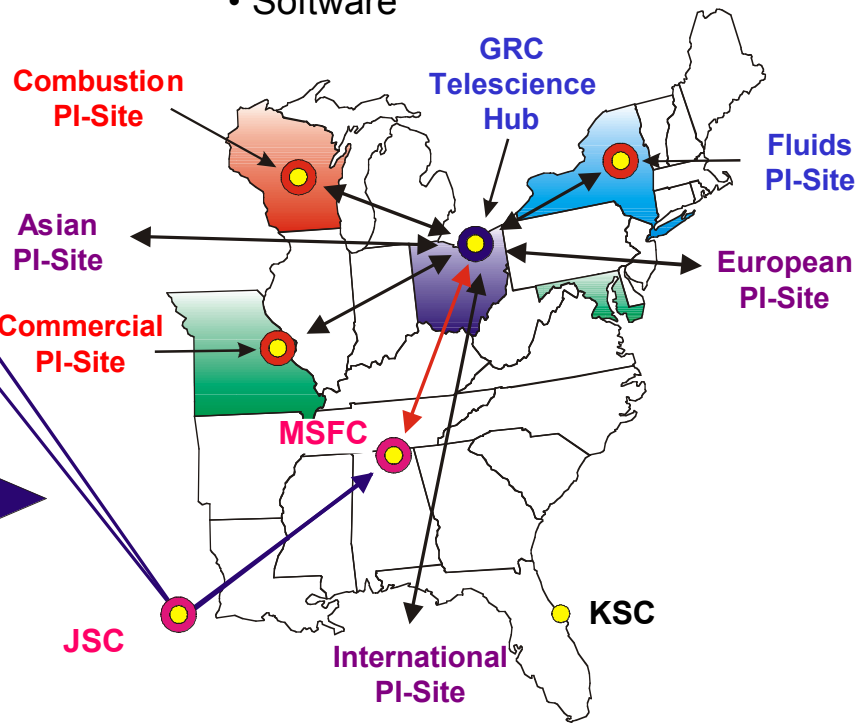
Space Station Based Equipment

- Combustion Integrated Rack
- Fluids Integrated Rack
- Shared Accommodations Rack
- Spares & Other Equipment
- Software

Ground Segment

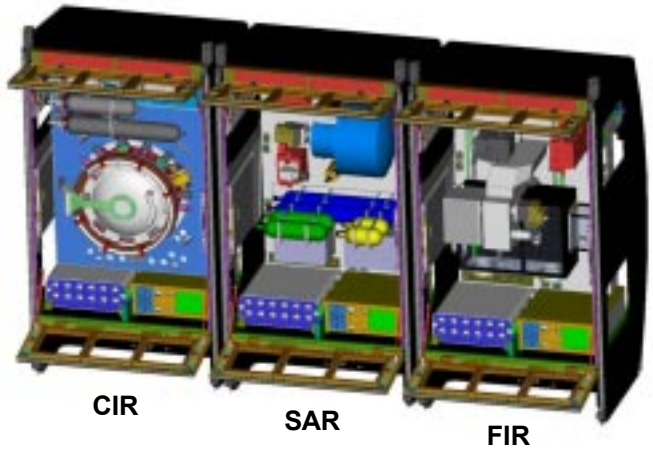
Earth Based Operations

- Ground Integration Unit
- Experiment Development Unit
- PTC Training Unit
- Ground Handling & Testing Equipment
- FCF-Unique Telescience Equipment
- Software



Three-Tier Solution to Meet the Requirements

Fluids and Combustion Facility

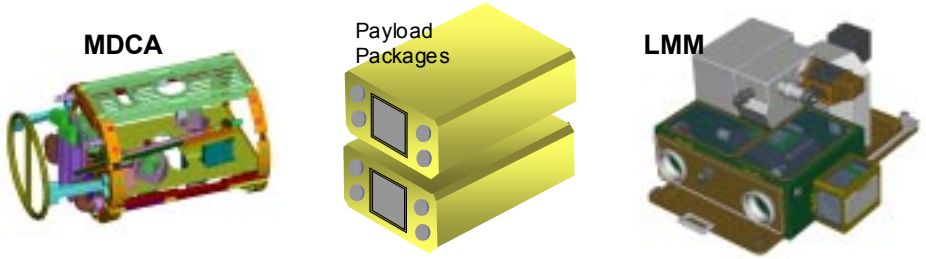


Tier 1

FCF Systems commonly needed by nearly all Fluids and Combustion Experiments

- Build once, launch once, use forever

Multi-Use Experiment Hardware

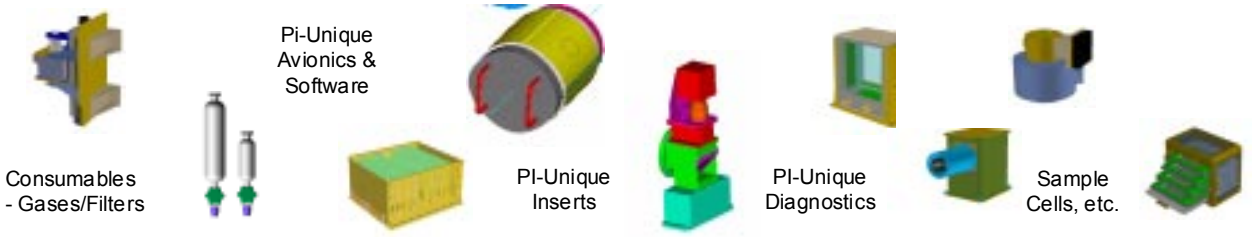


Tier 2

Multi-use experiment inserts customize FCF to a specific sub-discipline

- Build once, launch once per ~4 expts, reuse
- Other sub-discipline inserts reuse some equipment and concepts

PI Unique Equipment



Tier 3

PI unique equipment

- Build and launch for each experiment
- May reuse or add to capability of FCF or multi-use inserts

FCF Project History

- The preliminary analysis and definition phases of the FCF project were performed in-house by the government and supporting contractors at GRC.
- During these initial phases of the project, a Conceptual Design Review, Requirements Definition Review and Hardware Concept Review of the FCF were held.
- In-house definition work culminated in 1999 with a Preliminary Design Review of the Combustion Integrated Rack and a baseline of the science requirements envelope for the facility.
- A prime contract to complete the development of the FCF and its initial fluids and combustion payloads for ISS started in 2000. FCF development under this Microgravity Research, Development & Operations Contract (MRDOC) is fixed price incentive firm.
- CIR and FIR definition and design had proceeded somewhat independently until MRDOC start-up via two support service contractors. Synthesis of designs/approaches and enhancements in the FCF have been made since MRDOC start-up.
- Due to the prime contract nature of MRDOC, major milestone reviews such as the FCF PDR take on greater significance in terms of the government's visibility into the contractor's efforts and ensuring that customer needs are satisfied.

FCF PDR Purpose/Scope

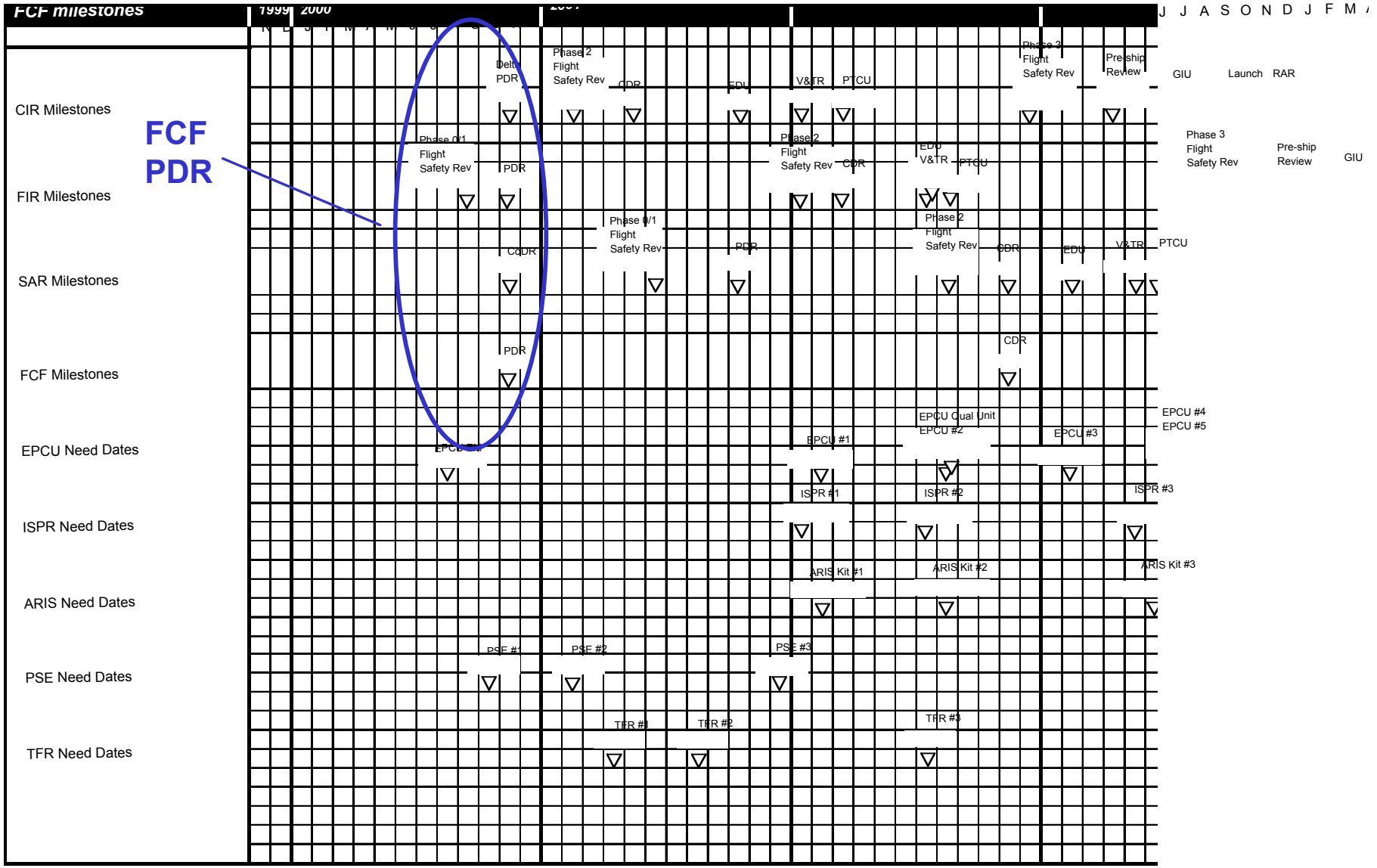
Purpose

The FCF preliminary design review is a formal technical review of the system design and development approach. The PDR is conducted after completion of the preliminary design synthesis and before detailed design process. The review is conducted prior to the fabrication of an engineering model of the flight experiment (except for the CIR, which will require a Delta-PDR to ensure that the CIR will properly function as part of the FCF system).

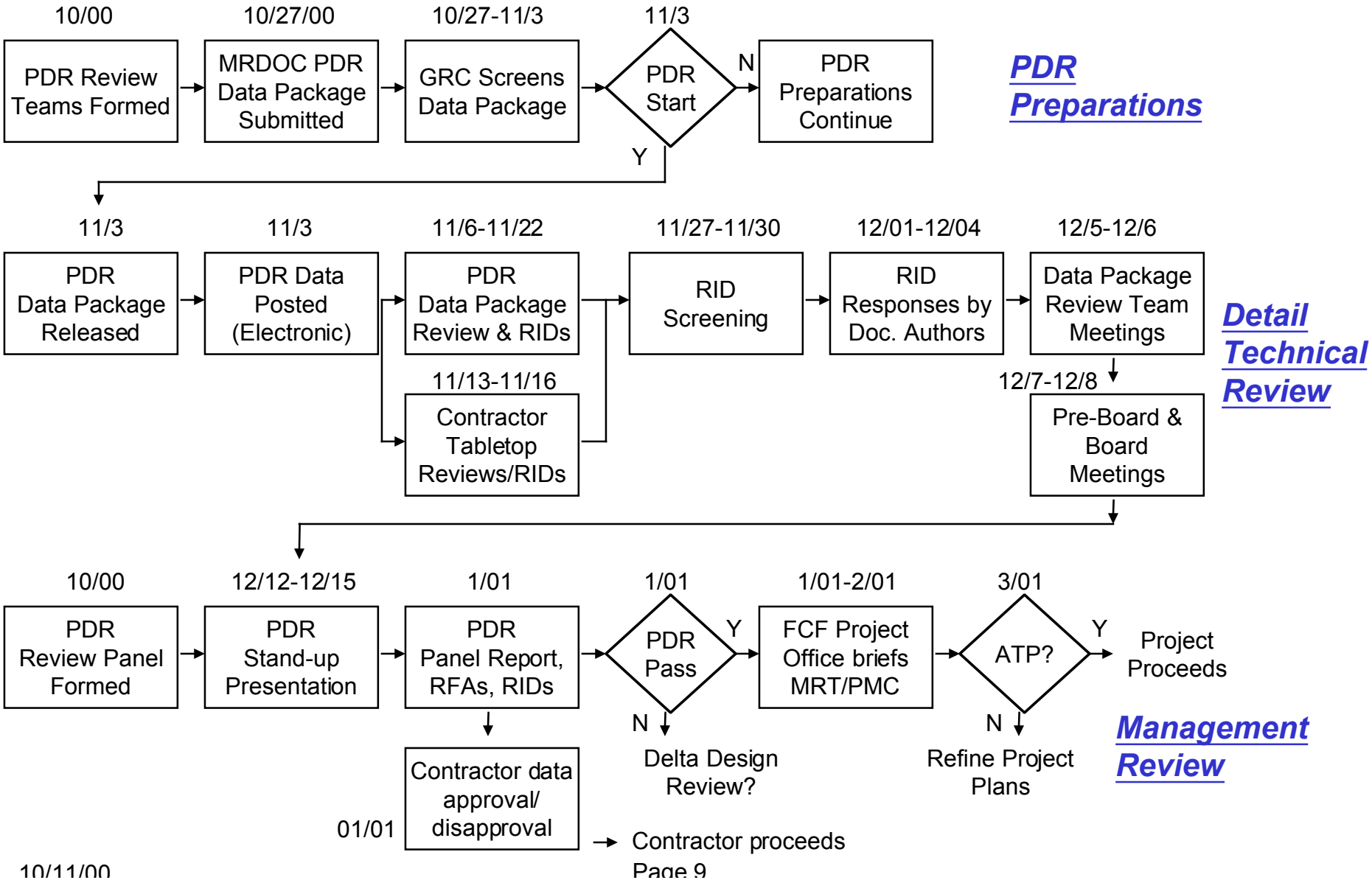
Scope

- **FCF Preliminary Design Review:** Review of FCF system design (flight and ground systems), system requirements compliance, operations concept, etc.
- **CIR Delta-Preliminary Design Review:** Review changes in the CIR design since the CIR PDR and ensure the CIR will properly function as part of the FCF system
- **FIR Preliminary Design Review:** Review of preliminary design of the FIR.
- **SAR Conceptual Design Review:** Review requirements for and functions of SAR and facility interdependence.

FCF Project Milestone Schedule



FCF PDR Review Process



Project Manger Guidelines/Commentary on PDR

- PDR Review Team leads, in consultation with the FCF team liaisons, are responsible for defining team membership to ensure adequate review of the FCF PDR data package. Also for ensuring that FCF customer interests are represented in the review and providing leadership to the review team in the review process.

- The number of RIDs generated is not as significant to the FCF Project Office as RID content. The Project Office is seeking technical, value-added input to the FCF preliminary design and/or identification of any major deficiency areas with specific proposals for change/correction…..not prime contractor bashing or open-ended commentary.

- The success of the prime contract is strongly tied to the success of the FCF project and, consequently, the Microgravity Science Program at GRC. I am interested in the best technical review possible to ensure that customer requirements are being met by FCF, as well as good government surveillance of the prime contract effort.

- However, I would also like to exit the FCF PDR with GRC, the prime contract, FCF and our program viewed in the best possible light by our external customers…… and with reasonable chance of obtaining FCF ATP from the Program.

Review Teams

Team	Team Lead	FCF Team Liaison
#1 -- Systems	M. Forkosh	D. Rohn
#2 -- Structures/Mechanical	M. Liao	C. Denniston
#3 -- Fluids/Thermal	D. Cheston	D. Edwards
#4 -- Avionics/Power	D. Emerson	T. Ruffner, L. Facca
#5 – Software	D. York	J. Ponyik
#6 -- Integration/Operations/ ISS Interfaces (IOI) (includes JSC, MSFC reviewers)	T. St. Onge	J. Free, D. Malarik, M. Nall
#7 -- Safety and Mission Assurance	G. Kelm	B. Patel
#8 -- Combustion Science/Payloads	A. Otero	K. Weiland/T. O'Malley
#9 -- Fluid Science/Payloads	N. Shaw	M. Hill/F. Gati
#10 -- Management Review	D. Francisco	R. Corban

Identification of team members

- Each Review Team Lead is to identify and obtain the necessary members based on documents the team is to review (See separate handout)
- FCF Liaisons can provide advice on the type of people needed
- FCF Liaisons and other FCF personnel should be part of the Review Teams
- Review Team Members need to be identified within the next few weeks. Documentation may be available prior to the indicated dates and would allow more time to review documents.
- Names of Review Team Members should be sent to D. Sedlak and T. Ruffner
- Possible sources of Review Team Members are E&TS, MSD, ISS, JSC, MRPO, NCMR, consultants, etc.

Document Matrix (excerpt)

PDR Data Package Item	Version	Doc. Screener	Review Teams									
			Systems	Structures	Thermal	Avionics	Software	IOI	S&MA	Combustion	Fluids	Mgmt
			X	X	X	X	X	X	X	X	X	X
PDR Presentation Package	final	Zurawski	X	X	X	X			X			
Design Data Package (Table-Top Reviews)	final	Discipline Leads	X	X	X	X						
Engineering Drawings/Schematics	prelim	Discipline Leads	X									
Applicable Standards List	final	Rohn	X									
Acceptance Plan, CIR	prelim	O'Malley	X									
Acceptance Plan, FIR	prelim	Gati	X							X	X	
Baseline Concept Description, FCF	draft	Rohn	X							X	X	
Baseline Concept Description, SAR	draft	Caruso	X							X		
Baseline System Description, CIR	prelim	O'Malley	X								X	
Baseline System Description, FIR	prelim	Gati	X							X		
Compliance Matrix, CIR	prelim	Weiland	X									
Parts List, CIR	prelim	Rohn	X									
Parts List, FIR	prelim	Rohn	X									X
***Risk Management Plan	final	Packard	X									X
Risk Management Report	prelim	Packard	X									X
Risk Matrices, Programmatic and Tech.	prelim	Packard										

Bold – being delivered 10/6/2000

*** - documents to be delivered in final form for Government approval

Involvement in Review Team Process

- Coordinate review of the documents, assigning specific documents to individuals, if appropriate
- Review documents on your own, participate in table-tops as appropriate
- Collect RIDs from Review Team Members and others who may wish to submit a RID against a document under your Team
- Screen RIDs
  - Ensure that technical issues identified are clearly stated and understood.
  - Combine similar RIDs, with approval from the RID authors.
- After the document's author provides a response to each RID, check response for clarity and then identify the RID type (I, II, III, IV)
- Lead the Team Meeting to disposition the RIDs
  - Establish final disposition for Type III RIDS
  - Develop recommended disposition for Type I, II & IV RIDs

Involvement in Pre-Board Process

- Present a summary of type III RIDs and any RIDs rejected
- Present recommended disposition of Type I, II and IV
- Present rejected RIDs if requested by the initiator
- Act as a member of the Pre-Board
  - Establish final disposition for Type II and IV RIDs
  - Develop recommended disposition for type I RIDs

PDR Presentation Agenda (Draft)

December 12

- Introduction (Salzman/Zurawski)
- PDR Objectives (Zurawski)
- Combustion/Fluid Science Overviews (Weiland/Hill)
- FCF PDR (FDC)

December 13

- CIR Delta PDR (FDC)
- FIR PDR (FDC)

December 14

- FIR PDR (FDC) (continued)
- SAR CoDR (FDC)

December 15

- FCF Project Plan (Zurawski)
- Summary of RID results (Rohn)

On-Line PDR System

- On-line system is currently being put together
- Documents will be accessed electronically via a web site
- RID entry and processing will occur electronically, via a web interface
- Details on how to access documents will be provided as soon as the system is up
- Details on RID entry and processing will be provided at the PDR Kickoff meeting, scheduled for November 3, 2000